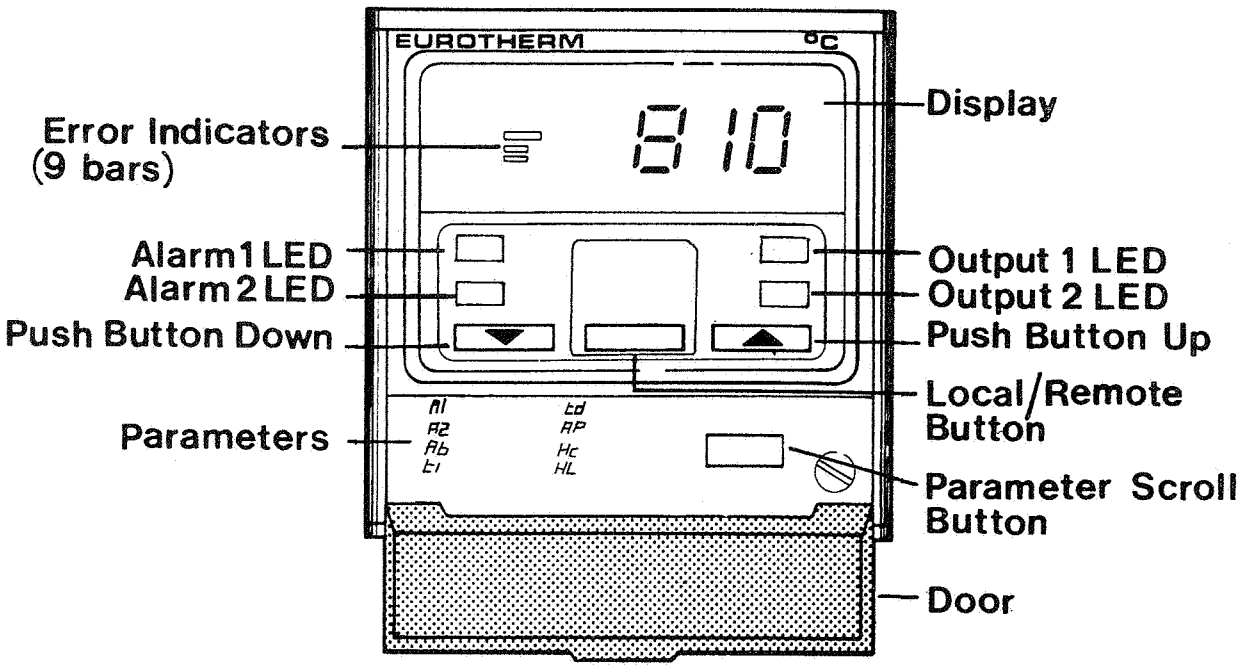
EUROTHERM

MICROPROCESSOR BASED
3-TERM CONTROLLER
TYPE 810

INSTALLATION AND OPERATING INSTRUCTIONS



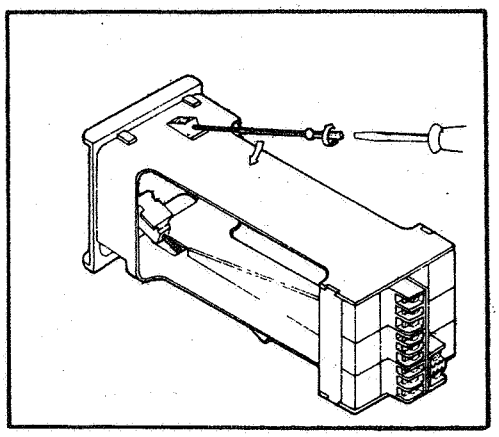
CONTENTS

	Page
INSTALLATION	1
DIMENSIONAL DETAILS	1
CONNECTIONS AND WIRING	2
Supply	3
Inputs	3
Outputs	3
Alarms	4
Options	4
OPERATION	5
Indications	5
Setting Up	6
Three Term Control Parameters	9
TYPICAL WIRING SCHEMATICS	11
ORDERING INFORMATION	13
Sales and Service	14

WARNING NOTE

This instrument has been designed and fully tested for single phase operation on supplies up to 264Vac. This not only includes the power supply input but all relay and triac outputs, whatever their function, and the terminals to which they are connected.

Care must be exercised during installation and wiring of this unit to ensure that no connections are made from phases other than the one being used to power the instrument. Failure to observe this precaution may result in instrument damage and or failure.



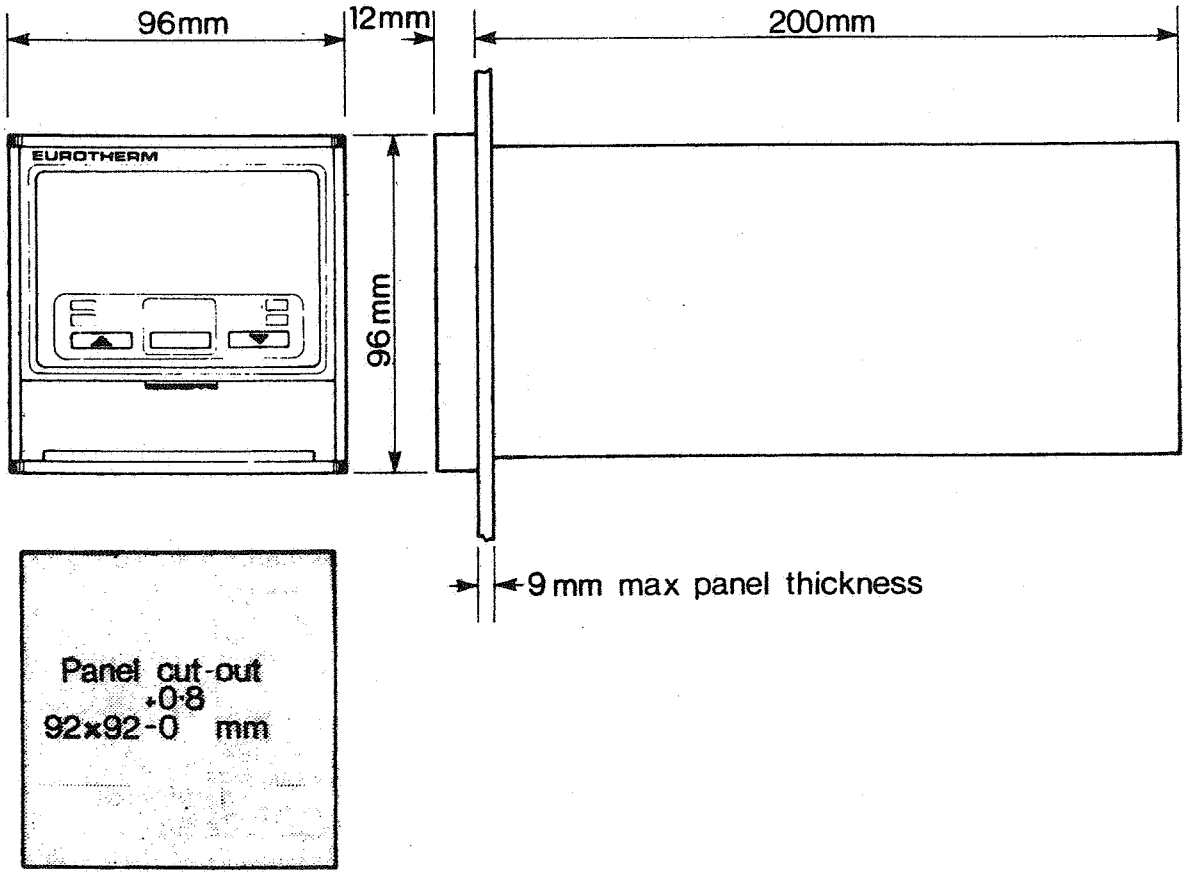
INSTALLATION

The instrument plugs into a panel-mounting sleeve which requires a DIN size 92 by 92mm cut-out as illustrated. Remove the instrument from the sleeve by opening the front panel door and with a screwdriver turn the screw, in the bottom-hand corner, counter clockwise. The instrument will start to withdraw from the sleeve and once the screw has been turned to its furthest extent the instrument can be withdrawn by hand. Remove the top and bottom mounting clamps from the sleeve by gently levering outwards and easing downwards inside the sleeve. Insert the sleeve through the cut-out via the front of the panel. Fit the mounting clamps in the slots from inside the sleeve and from the rear of the mounting panel tighten with a screwdriver.

By hand ease the instrument into the sleeve to its furthest extent. With a screwdriver turn the screw in the bottom right-hand corner clockwise until tight. The instrument will be pulled completely into the sleeve, engaging the rear terminals and be fully secured.

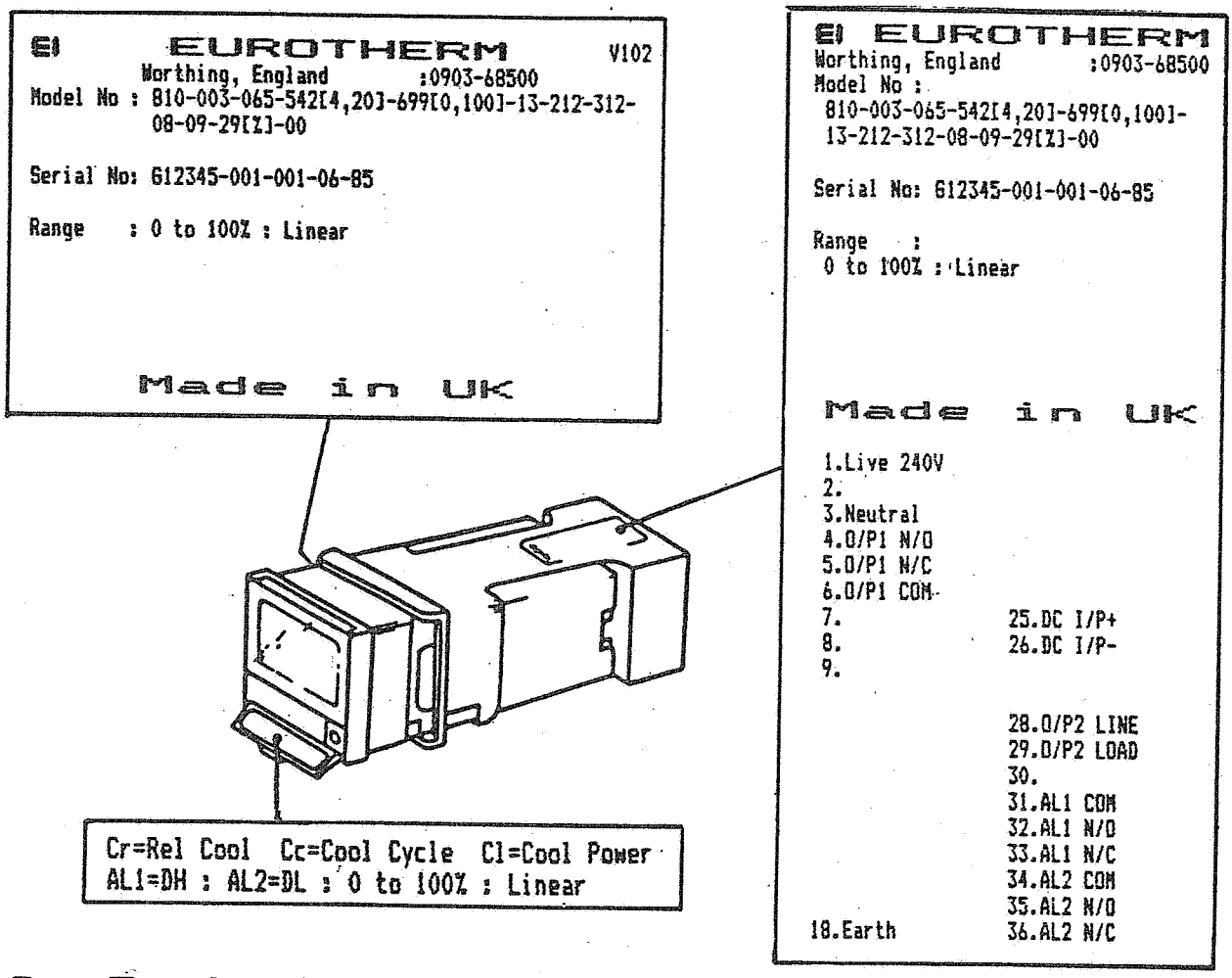
Note: Do not attempt to dismantle the instrument without referring to the Maintenance Manual.

DIMENSIONAL DETAILS

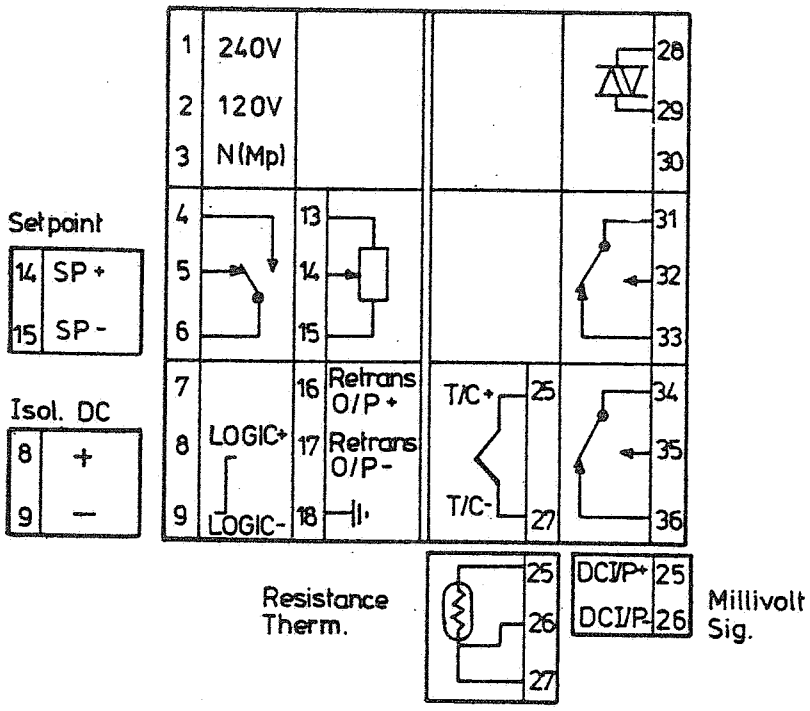


CONNECTIONS AND WIRING

Electrical connections are made via 3-way terminal blocks on the rear of the instrument. All connections are low current and a 16/0.20mm wire size is adequate. Labels on the instrument and sleeve indicate the specific connections for the instrument.



Rear Terminal Connections



Rear Terminals

Supply

1	Live 240V
2	Live 120V
3	Neutral

Power supply for the instrument is connected to terminals 1, 2 and 3. Neutral to terminal 3 and either 200/220/240V to terminal 1 or 100/110/120V to terminal 2. The ground connection is made to terminal 18.

18	Earth

Instrument Earth

Inputs

Note: On some instruments a filter module is fitted, above the input terminal block. Ensure that the GREEN lead is connected to terminal 18 and one BLUE lead is connected to terminal 27 for T/C inputs or to terminal 26 for all other inputs, and the other BLUE lead to terminal 17.

Thermocouple

25	T/C +
27	T/C −

Thermocouple connections are made to terminal 25 and 27, positive lead to 25 and negative lead to 27. Compensating cable of the correct type must be used between the thermocouple and the instrument and must be connected in the correct polarity. To check compensating lead polarity lift the leads off the thermocouple, twist them together and apply heat to the junction. The digital readout value should increase.

An open circuit thermocouple normally causes the digital value to move upscale and the heat is turned off. For processes where the heat must remain on for open circuit thermocouple, downscale indication (option 24) is specified.

Error indicators show direction of break protection and when the upper/lower limit of scale is reached the display blanks.

Resistance Thermometer

25	RT (V1)
26	RT (V2)
27	RT (I)

Platinum resistance three wire thermometers are connected to terminals 25, 26 and 27. Connect the single connection side of the bulb to terminal 25 and the double connection to terminals 26 and 27.

25	DC I/P +
26	DC I/P −

Millivolts Signals

Inputs are connected to terminals 25 and 26 as shown.

Outputs

Relay

4	O/P1 N/O
5	O/P1 N/C
6	O/P1COM

The controller is fitted with an output relay which has a single changeover contact, connected internally between terminals 4, 5 and 6. With no supply to the instrument the relay is de-energised and terminal 4 is normally open (N/O). The relay is energised to apply power to the load and the voltage at terminal 6 is switched through to terminal 4. The contact is rated at 2A/264V rms and is suitable only for use with low-power loads. Slow cycle time-proportioning or on-off control is available. Contact suppression is provided between the N/O contacts and the wiper.

Logic

8	LogicO/P1+
9	LogicO/P1−

A logic output is provided at terminals 8 and 9. This output is an unisolated 10mA at 14Vdc minimum signal with slow or fast cycle time proportioning or on-off. This output is suitable for use only with the Eurotherm Thyristor Units.

Isolated DC

8	DCO/P1+
9	DCO/P1−

An isolated dc output is provided at terminals 8 and 9, see code for relevant output.

Triac

28	O/P1 LINE
29	O/P1 LOAD

With controllers provided with triac output, connections are made to terminals 28 and 29 as shown. The triac is connected across the line and load terminals, with a live supply (1A/264V ac max) connected to the line and one side of the load connected to the load terminal. The other side of the load should be connected to the neutral line. During the 'ON' time the circuit between 28 and 29 is closed.

Alarms

31	AL1 COM
32	AL1 N/O
33	AL1 N/C

34	AL2 COM
35	AL2 N/O
36	AL2 N/C

Controllers provided with relay alarm outputs are internally connected to terminals 31, 32 and 33 for Alarm 1 and to 34, 35 and 36 for Alarm 2. Terminals 32 and 35 are N/O when the relays are de-energised. When energised the voltages at terminals 31 and 34 are switched through to the output terminals, 32 and 35 respectively. Relay contact rating 1A/264V rms. Contact suppression is provided between the N/C contacts and the wiper with the relay de-energised in alarm (fail safe). Suppression is provided between the N/O contacts and wiper with the relay 'energised in alarm'.

Options

Remote Analogue Setpoint.

14	Rem S.P I/P+
15	Rem S.P I/P−

Voltage or current input for remote analogue setpoint is applied to terminals 14 and 15 as shown. The remote analogue setpoint can be set by means of an external 10K ohm potentiometer, connect as shown to terminals 13, 14 and 15.

When rear selection of the Local/Remote facility is required an external latching switch should be connected between terminals 11 and 12.

External Power Limit

13	Pot (Max)
14	Pot Wiper
15	Pot (Min)

Maximum heat output can be set externally by means of an analogue input positive to terminal 14, negative to terminal 15 or a 10K to 47K ohm potentiometer as shown.

2nd Setpoint

11	2nd S.P Sel
12	2nd S.P Sel

A 2nd setpoint can be selected by a front pushbutton, annotated SETPOINT 2, and/or an external selection button connected to the rear terminals 11 and 12 as shown. When front and rear selection are provided, connected in parallel, closure of either the front or rear contacts selects 2nd setpoint.

Digital Setpoint Trim

14	Rem Trim I/P+
15	Rem Trim I/P−

An instrument with a digital setpoint trim accepts a full scale analogue setpoint signal to which is added a ±10% digital setpoint trim. The analogue signal may be a voltage or current input to terminals 14 and 15 or a 10K ohm potentiometer connected between terminals 13, 14 and 15.

Analogue Setpoint Trim

An instrument with an analogue setpoint trim has full scale digital setpoint to which is added a ±10% analogue trim. The analogue trim may be a voltage or current input to terminals 14 and 15 or a 10K ohm potentiometer connected between terminals 13, 14 and 15.

Analogue Retransmission.

16	Retrans O/P+
17	Retrans O/P−

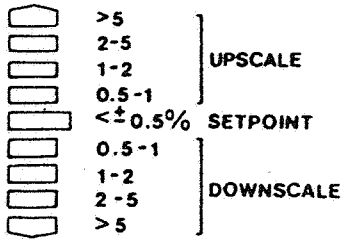
This unlinearised 0-10V or 0-5V (10mA max) analogue output is available on terminals 16 and 17 as shown.

OPERATION

Temperature Setting

When power is connected the flourescent indicator panel will display the measured value of the temperature in digital form. Depress and release either the UP or DOWN button and the display will indicate the setpoint value for five seconds and then revert to the measured value.

To alter the setpoint depress the respective UP/DOWN button and after a delay of 3 seconds the setpoint will



Manual Power Setting

With an Auto/Manual instrument selected to manual the manual power output will be actual power being delivered at the instant of selection. Depress and release either the UP or DOWN button and the display will indicate the current output power in percentage. To alter the power depress the respective UP/DOWN button and the power will change in the required direction. On this instrument the output power being delivered to the load, whilst switched to the auto mode of operation, can be displayed as a percentage by depressing the UP and DOWN buttons together. As soon as the two buttons are released the display will revert to measured value.

Indications

The fluorescent indicator panel measured value, setpoint and all parameters particular to the specific instrument. These can include alarms, PID settings approach, heat/cool cycle times, maximum power, 2nd setpoint settings and setpoint trim.

When a parameter other than measured value is displayed, indication is provided by means of a flashing dot at the top of the display.

In the event of a thermocouple break the numeric display goes blank when the maximum scale range is reached.

Error Indications

The nine segment bars situated to the left of the digital readout provide error percentages of measured values of temperature with respect to the set temperature. Illumination of the centre bar only indicates within 0.5% of setpoint.

The bars above and below the centre bar indicate, when illuminated, the upscale and downscale errors respectively, in increasing magnitude. For instruments with a setpoint trim facility operation of the UP/DOWN buttons causes the nett setpoint (setpoint and trim) to be displayed.

Alarms

The respective ALARM LEDs will illuminate whenever an alarm is ON. Optionally, an instrument can have the numeric display flashing in an alarm condition with no alarm boards fitted and therefore the ALARM LEDs are inoperative. (Not applicable to Auto/Manual instruments).

Outputs

The OUTPUT LEDs illuminate when ever an output is operative. Normally OUTPUT 1 LED indicates a heat channel and OUTPUT 2 LED a cool channel output. If a triac heat channel is incorporated OUTPUT LED2 will illuminate for the heat channel and any associated cool channel is indicated by the OUTPUT 1 LED.

2nd Setpoint

Indication of 2nd setpoint, either front or rear selected, is by LED in the centre of the fascia. When illuminated the 2nd setpoint is selected and when extinguished the instrument reverts to its normal setpoint.

Local/Remote

Indication of a remote facility on local/remote instruments is by the LED in the centre of the fascia. Selection of either the front panel Local/Remote pushbutton or closure of the switch for rear selection causes this LED to illuminate in remote and extinguish in local.

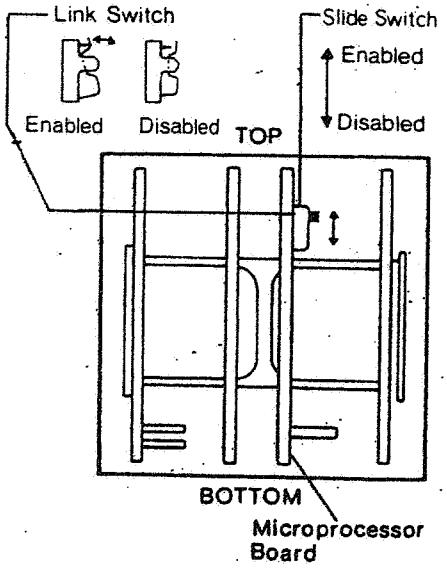
Auto/Manual

Indication of the manual facility on Auto/Manual instruments is by the LED in the centre of the fascia. Selection of either the front panel Auto/Manual pushbutton or closure of the switch for rear selection causes this LED to illuminate in manual and extinguish in auto. If an optional Local/Remote facility is used the remote LED will illuminate when in Remote.

Setting Up

Setting up is achieved by access to the parameters through a scroll button which is located behind the front door panel.

The instrument is supplied with the scroll button disabled. Values of proportional band, integral and derivative times are set to a standard to suit the average application. To modify these values the scroll button has to be enabled. To enable the scroll button, remove the instrument from its sleeve. Locate the switch at the rear of the microprocessor circuit board (as shown). Slide the switch towards the top of the instrument to enable the scroll button. To disable the scroll button slide the switch towards the bottom of the instrument. If a link switch is fitted, press down on the link and engage the hook (as shown).



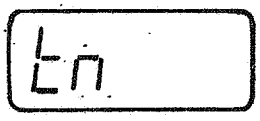
Self Tuning

Self tuning, if enabled, will automatically tune (setting PID parameters) at half-way to setpoint on power-up and then continuously adjust the proportional band whenever an error of 4°C or greater is seen by the controller. Self tuning may be initiated manually as described below. The self tune PID settings can be monitored at any time.

Parameters

To the left of the scroll button and on the inside of the door panel are listed a series of control parameters, pertinent to that instrument. Each parameter is shown in abbreviated form. Operation of the scroll button causes the abbreviation to appear in the left hand segments of the digital fluorescent indicator panel. After approximately two seconds the abbreviation is replaced by the value of that parameter. NOTE: Until the scroll button is released the first digit of the abbreviation is not displayed. Adjustment of a parameter is achieved by means of the UP/DOWN buttons. Subsequent operation of the scroll button selects the next parameter listed.

NOTE: If no action is taken by the operator within eight seconds of the last action, the display will automatically revert to indicating the measured value.



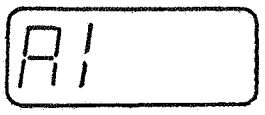
tn — Self Tuning

To select self tuning, depress the scroll button so that 'tn' is displayed and depress the UP button. The instrument will now automatically self tune. To terminate self tuning depress the scroll button so that 'tn' is displayed and depress the DOWN button.

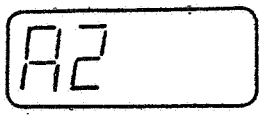
Limit Alarms

When a high or low deviation or band alarm is fitted the alarm setpoint can be adjusted between 0 and a top limit, where the top limit is 20% of the span. The limits for a full scale alarm are the limits of the span of the instrument.

A1 - Alarm 1

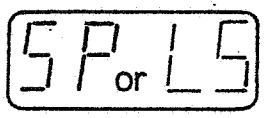


To set the limit for one of the alarms depress the scroll button so that 'Al' is displayed. After approximately one second the digital readout will indicate the temperature setting of Alarm 1. To set the limit to the required value depress the respective UP/DOWN buttons until the limit, top or bottom, is reached. This limit will appear in the display.



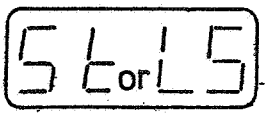
A2 - Alarm 2

To set the limit of the other alarm depress the scroll button so that 'A2' is now displayed. To set this limit depress the respective UP/DOWN buttons until the required limit is reached.



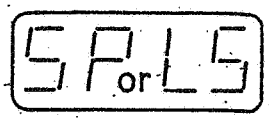
SP or LS — 2nd Setpoint

For instruments with a 2nd setpoint facility depress the scroll button so that 'SP' or 'LS' is displayed. Depress the UP/DOWN buttons to set the 2nd setpoint to the required value.



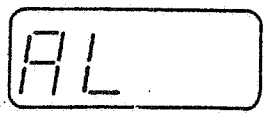
St or LS — Digital Setpoint Trim

For instruments with a local digit setpoint trim facility depress the scroll button so that 'St' or 'LS' is displayed. Depress the UP/DOWN button to set the degrees of trim, which is adjustable ±10% of the instrument span.



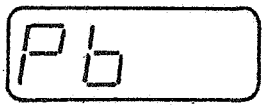
SP or LS — Analogue Setpoint Trim

For instruments with a remote analogue setpoint trim facility depress the scroll button so that 'SP' or 'LS' is displayed. Depress the UP/DOWN buttons to set the local digital setpoint.



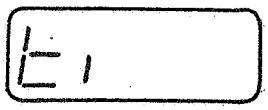
AL - Alarm

For instruments fitted with Local/Remote, 2nd setpoint or trim facilities and an alarm channel, depress the scroll button so that 'AL' is displayed. To set the limit of the alarm depress the respective UP/DOWN buttons to set the required limit.



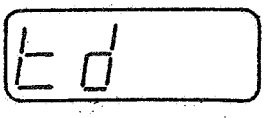
Pb - Proportional Band, On/Off Hysteresis % instrument span

Depress the scroll button so that 'Pb' is displayed. Depress the UP/DOWN buttons to set Pb to required value. The proportional band settings are in 15 steps from 0.5 to 100%. With on/off control instruments Pb sets the ON/OFF hysteresis in % of span.



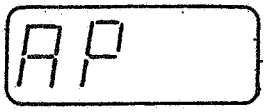
ti - Integral (Secs)

Depress the scroll button so that 'ti' is displayed. Depress the respective UP/DOWN buttons to set the integral time to the required settings in 14 steps from indicating OFF to 1800 seconds.



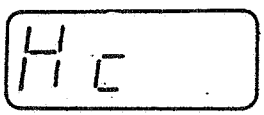
td - Derivative (Secs)

Depress the scroll button so that 'td' is displayed. Depress the relative UP/DOWN buttons to set the derivative time. The derivative settings are in 13 steps from indicating OFF to 600 seconds.



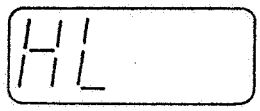
AP - Approach

Depress the scroll button so that 'AP' is displayed. This control allows adjustment of the rate of change of temperature as setpoint is approached. The approach value is set by the respective UP/DOWN buttons and selectable from 0.25 to 3 in 9 steps.



Hc - Cycle Time (Secs)

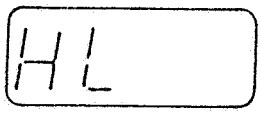
Depress the scroll button so that 'Hc' is displayed. Depress the UP/DOWN buttons to set the required cycle time. Cycle times available are 0.3, 1.5, 10, 20, 40 and 80 seconds. For logic outputs it is normally set to 0,3 and for relay outputs to 20 seconds. (Settings below 20 seconds for relay outputs can cause increased contact wear and premature failure). With dc outputs the cycle time is fixed at 0.3 seconds. The cycle time setting is inoperative for ON/OFF control instruments.



HL — Maximum Power (Heat or Cool only)

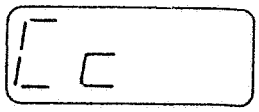
Depress the scroll button so that 'HL' is displayed. Depress the UP/DOWN buttons to set the percentage of the required power, normally set to maximum. Irrespective of the range given to H.L. (see table below), this parameter will vary the maximum output power from zero to 100%.

SETPOINT RANGE	INSTRUMENT TYPE	
	Controllers which have a remote input signal and fitted with a cool channel and/or one alarm only	All other Controllers
	RANGE OF MAX HEAT POWER (H.L.)	
WITHOUT DECIMAL PLACES (XXXX)	0 - 100	0 - 100
WITH ONE DECIMAL PLACE (XXX.X) ≥100.0 <100.0	 0 - 1000 0 - 100	 0 - 100 0 - 10.0
WITH TWO DECIMAL PLACES (XX.XX)	0 - 100	0 - 1.00



HL - External Power Limit

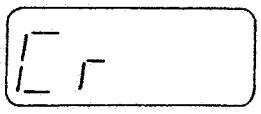
For an instrument with an external power limit facility depress the scroll button until 'HL' is displayed. Depress and hold depressed one of the UP/DOWN buttons and adjust the external power limit potentiometer to the required power setting.



Cc - Cool Cycle (Secs)

Depress the scroll button so that 'Cc' is displayed. Depress the UP/DOWN buttons to set the required cycle time. The cool cycle time is set from 0.3 to 80 seconds and should ideally be set to the highest time possible.

Note: On non-linear cool outputs (code 093) whenever cool is demanded the cycle time is automatically set to 10 seconds, therefore no setting of the cool cycle time is required.



Cr - Relative Cool

Depress the scroll button so that 'Cr' is displayed. Depress the UP/DOWN buttons to set the required cool gain, which is relative to the primary output and adjustable in 9 steps from 0.25 and 3.

CL - Maximum Power (Cool)

Depress the scroll button so that 'CL' is displayed. Depress the UP/DOWN buttons to set the percentages of the required power. Maximum power settings available are 0 to 100% in increments of 1%.

End

Once all parameters have been scrolled the term 'END' is displayed. After eight seconds the 'END' term is automatically replaced by the measured value.

Control Variables (steps)

Standard 810:

Prop band (%) 0.50, 0.75, 1.00, 2, 3, 4, 6, 8, 12, 35, 50, 100
Integral (secs) off, 15, 30, 45, 60, 90, 120, 150, 200, 300, 400, 600, 900, 1200, 1800
Derivative (secs) off, 5, 10, 15, 20, 30, 40, 60, 90, 150, 200, 300, 400, 600
Approach (rel Pb) 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 2.00, 2.50, 3.00
Cycle Times (secs) 0.3, 1, 5, 10, 20, 40, 80
Maximum Power (%) 0 to 100 in 1% steps
Relative Cool 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 2.00, 2.50, 3.00

810 Auto/Manual

Prop band (%) 0.5, 0.8, 1.1, 1.7, 2.5, 4, 6, 8, 13, 20, 26, 34, 50
Integral (secs) off, 5, 7, 10, 15, 25, 40, 65, 100, 145, 210, 300, 450, 700, 1100, 1700
Derivative (secs) off, 1.5, 2.5, 4, 6, 9, 12, 17, 24, 33, 46, 65, 90, 130, 180
Cycle Times (secs) 0.3, 1, 5, 10, 20, 40, 80
Maximum Power (%) 0 to 100 in steps

Three Term Control Parameters

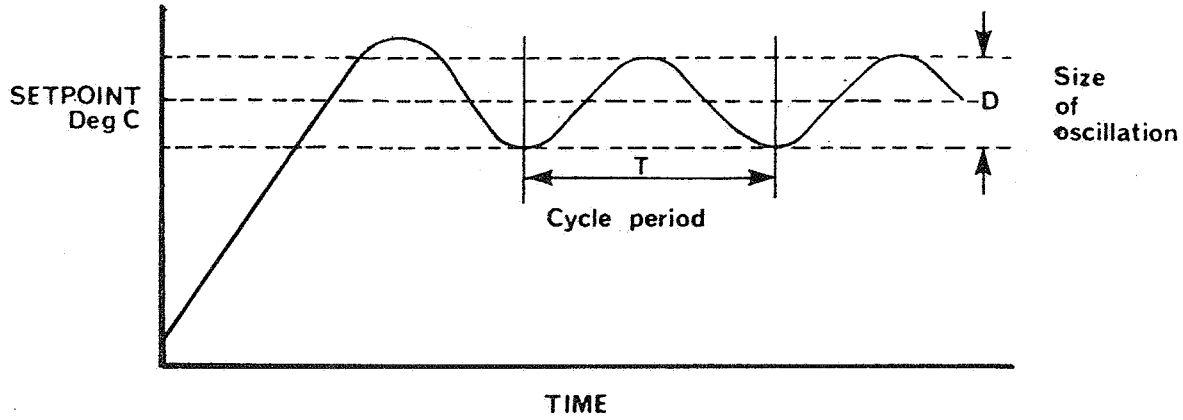
Three term control parameter values for optimum control are a matter of application. If the values are unknown the following method will give acceptable settings which can then be finally adjusted to give the optimum control.

1. The practical approach is to control the load with an on-off system and measure the resulting oscillation and the number of times it occurs per minute.

Set the following conditions:

Proportional band, Pb%	=	0.50	Maximum power, HL%	=	100
Integral time, ti	=	OFF	Approach, AP	=	1.00
Derivative time, td	=	OFF	Setpoint,	=	As required

2. Switch on the process and observe the start-up and running conditions which should appear as shown:



3. From these observations the following initial parameter values can be approximated.

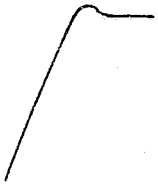
Pb	=	D/Full scale x 100% (Set to next higher value if between fixed settings)
ti	=	T seconds
td	=	T/5 seconds (Set to next lower value if between fixed settings)

4. Reset instrument with the values calculated in para. 3 and restart the process from cold. If oscillation still results increase proportional band/decrease derivative.

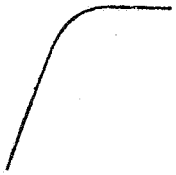
5. Example:-Using a 1200 deg C Muffle furnace with settings as in para. 1, the following waveforms resulted.

Pb = 0.50
ti = Off
td = Off
HL = 100
AP = 1.00

Pb = 2
ti = 600
td = 150
HL = 100
AP = 1.00



Pb = 3
ti = 600
td = 60
HL = 100
AP = 1.00



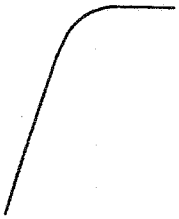
Pb = 3
ti = 600
td = 60
HL = 100
AP = 2

6. The Approach control adjusts the start up characteristics of the furnace by releasing the drivative action at some variable point away from setpoint. This term is expressed as the number of proportional bands away from the setpoint value. Below are shown various waveforms for the same PID settings but with different Approach values.

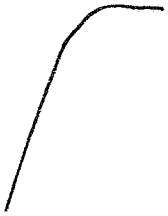
AP = 0.25

AP = 0.50

AP = 1.00



AP = 2.00



AP = 3

TYPICAL WIRING SCHEMATICS

Figure 1. Three-phase fast cycling, close delta synchronised system using the logic output from an 810 Controller to drive a pair of Eurotherm 450 series thyristor units with thermocouple sensor. A Eurotherm Alarm Collection unit 603 gives, in this case, an audible warning of partial load failure.

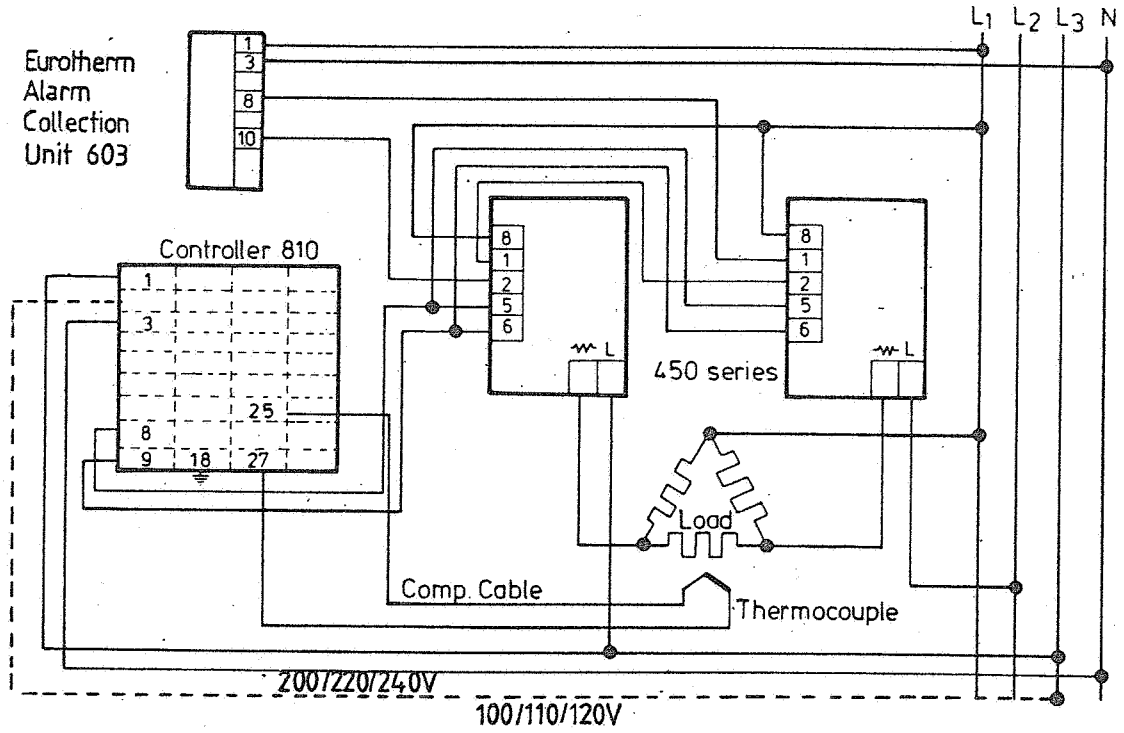


Figure 2. Relay output (heat) directly switching load with thermocouple sensor.

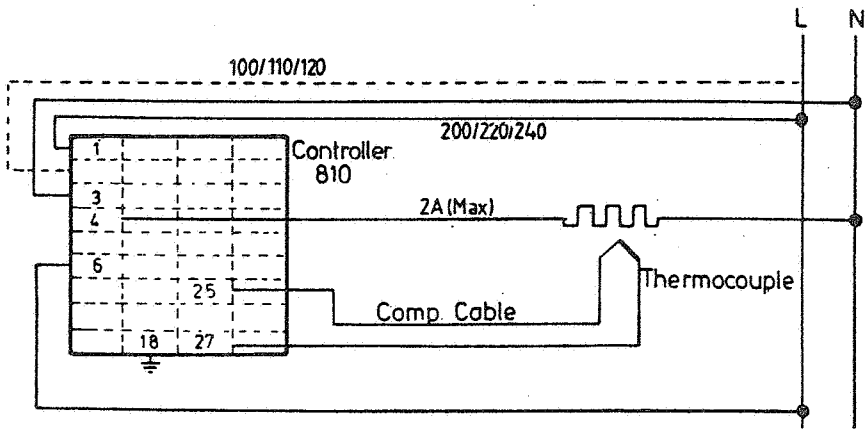


Figure 3. The 2A relay output drives a contactor for heating and the 1A triac output operates a solenoid valve for cooling. A thermocouple is used as the input sensor.

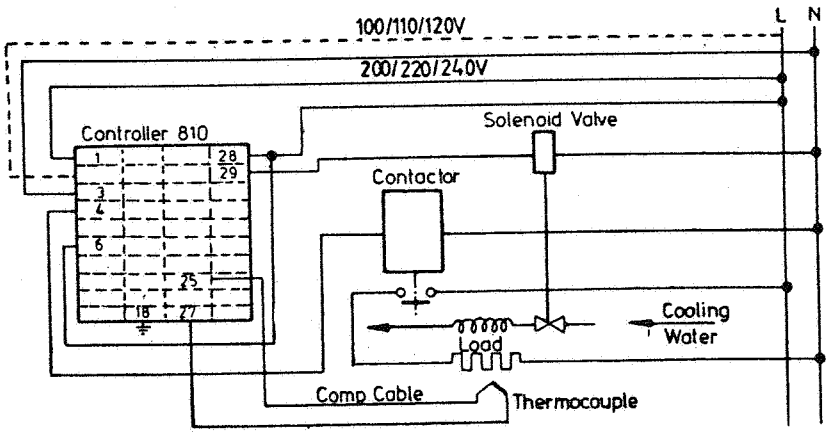
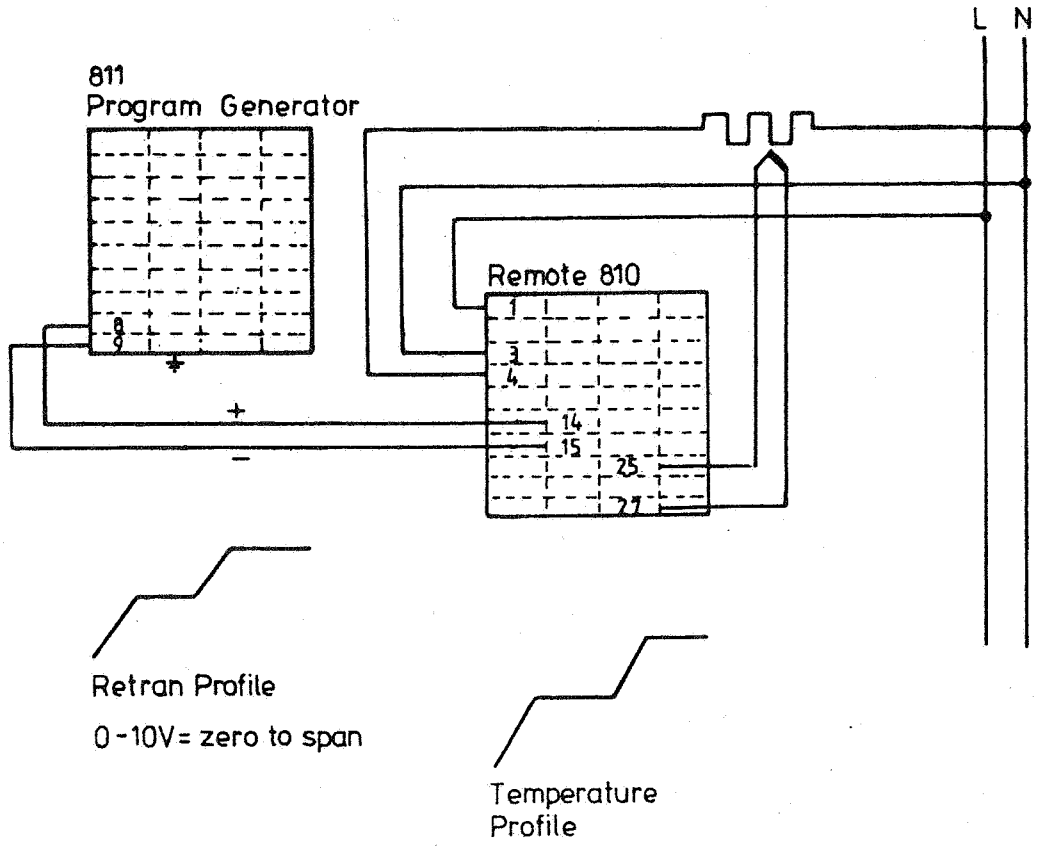


Figure 4. A remote input 810 controller whose setpoint is controlled by an 811 Setpoint Generator.



Ordering Information

You are welcome to order by description or by code below which is a useful check list.

Basic Product

	Code
Microprocessor Based 3-Term Controller	810

Outputs

	Heat	Cool
No output	000	000
Relay slow cycle with power feedback (2A 240V)	003	—
Relay on/off (no 3-Term)	028 ••	—
Logic output unisolated 14V dc min at 10mA	047	—
Logic on/off	137 ••	—
Isolated 1 – 5V (20mA max)	068	068 •
Isolated 0 – 5V (20mA max)	070	070 •
Isolated 0 – 10mA (10V dc max)	071	071 •
Isolated 0 – 20mA (10V dc max)	072	072 •
Isolated 4 – 20mA (10V dc max)	073	073 •
Isolated 0 – 10V (20mA)	123	123 •
Isolated 5 – 1V (20mA max)	128	128 •
Isolated 5 – 0V (20mA max)	130	130 •
Isolated 10 – 0mA (10V dc max)	131	131 •
Isolated 20 – 0mA (10V dc max)	132	132 •
Isolated 20 – 4mA (10V dc max)	133	133 •
Isolated 10 – 0V (20mA)	124	124 •
Triac heat cycling	092	—
Triac on/off	058	058
Triac cycling (1A 264V ac) linear characteristics	—	065
Triac cycling (1A 264V ac) non-linear characteristics	—	093
Motor Valve Controller Dual Relays (2A 240V)	178 ■	178 ■

• Available only with no heat output or triac heat cycling on output 1
•• Not available with self tuning
■ Only Motor Valve Controller output—heat or cool channel

Notes: 1. Add 100 to code of dc outputs for reverse LED output indication
e.g. Isolated 0 – 10V, code 123 + 100 = code 223
2. Auto/Manual (option 44) available with heat output only

Inputs The input code cosists of three digits

First digit		Second and third digits	
Scale	Code	Type	Code
Deg C	0	Iron/Constantan J	01
Deg F	1	Iron/Contantan DIN	02
Deg K	2	Ni Cr/Ni Al K	03
Volts	4	Cu/Con T	04
mA	5	Pt 13% Rh/Pt R	05
mV	7	Pt 10% Rh/Pt S	06
Ohms	8	• Pt 30% Rh/Pt 6% Rh B	08
		W/W 26% Re (Engelhard)	09
		Ni Cr/Con E	12
		W 5% Re/W 26% Re (Hoskins)	24
		Platinel II	28
		W/W 26% Re (Hoskins)	29
		Linear inputs See note below	42
		Rt 100Ω at 0°C	70

e.g. 003 = Deg C Type K

Note: Linear inputs, assuming a zero reference, are coded X42. The magnitude of the input is then specified, e.g. 442 (4.2; 7.8) is a voltage input from 4.2V to 7.8V.

• Type B thermocouple, no cal error accuracy below 600°C.

Scale Ranges

Standard ranges	Code
– 500 to + 500	607
– 250 to + 750	628
– 250 to + 250	608
– 125 to + 125	609
– 100 to + 400	627
– 100 to + 300	626
0—50.0	610
0—95.0	611

Standard ranges	Code
0—200	612
0—300	613
0—400	614
0—500	624
0—600	615
0—800	616
0—1000	617

Standard ranges	Code
0—1200	618
0—1500	625
0—1600	619
0—2000	620
0—2400	621
0—3000	622
0—4000	623

Note: For display ranges not shown, quote code 699 followed by the magnitude. *e.g.* 699 (0:750)

Supply Voltage

110 ± 10%	50/60Hz	10
220 ± 10%		12
120 ± 10%		24
240 ± 10%		13

Alarm

Configurations—the alarm codes consist of three digits

Number	1st digit	2nd digit	3rd digit
0	—	No relay	Flashing only
1	Band	Non latching	Energised alarm
2	Deviation high	—	De-energised alarm
3	Deviation low	—	Ener. alarm and flashing
4	Full scale high	—	De-ener. alarm and flashing
5	Full scale low	—	—

Notes: 1. With Self tuning—Band/Deviation high, non-latching, de-energised only
2. With Motor Valve Controller—Any type of alarm, non-latching, de-energised only
3. Code 0 in each alarm field for no alarms

Options

No power feedback	08
Screw terminals (Fastons standard)	09
No cold junction compensation (50°C ext. ref.)	72
No cold junction compensation (0°C ext. ref.)	11
Downscale thermocouple break action	24
Fascia units not equal to input units (specify blank or units)	29
Retransmission of measured value (0 – 10V unisolated)	60
Retransmission of measured value (0 – 5V unisolated)	61
Setpoint stop (lower)	712 ••
Setpoint stop (upper)	713 ••
Auto/Manual	44
■ Self tuning	91
■ Local/remote setpoint unisolated ┐	
■ Remote setpoint	
■ 2nd setpoint	
■ External power limit	see additional features table below
■ Analogue Setpoint + Local trim	
■ Analogue trim + Local Setpoint ┘	

■ Only one alarm available with these options
•• setting required

Additional Features Table

	Facility 1st digit	Input 2nd digit	Selection 3rd digit
0	—	0 – 5V	—
1	Analogue Setpoint + Local Trim	1 - 5V	—
2	Analogue Trim + Local Setpoint	0 – 10V	—
3	—	0 – 10mA	—
4	Local Remote	0 – 20mA	—
5	Remote Setpoint	4 – 20mA	Front
6	External Power Limit	– 5V to + 5V	Rear
7	—	Potentiometer	Front & Rear
8	2nd Setpoint	None	No selection
9	—	Special	—

Notes: 1. 2nd Setpoint has no input
2. External power limit, remote Setpoint and trims have no selection
3. These facilities are mutually exclusive
4. If Local/Remote required with Auto/Manual (option 44) only codes 1X8 and 2X8 are permissible.
5. If Local/Remote is required with a Motor Valve Controller only codes 4X6 and 5X8 are permissable. (X is any valid number)

e.g. Local/Remote, 0 – 5V input with front selection, code 405
2nd Setpoint with rear selection, code 886
External power limit set by external potentiometer, code 678

Example order

810 – 003 – 000 – 003 – 618 – 13 – 112 – 412 – 09 – 00
810 with 2A/240V slow cycle relay output (heat) / no 2nd output / 0 – 1200°C type K/240 volt supply/band alarm plus full scale high alarm, non latching, de-energised in alarm/screw terminals.

Ordering Code

Basic product	Heat Output	Cool Output	Input	Scale range	Supply voltage	Alarm 1	Alarm 2	Options	End
810 –	—	—	—	—	—	—	—	—	00